CIRCUIT DESCRIPTION

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ELECTRONIC SWITCHING SYSTEMS

NO. 3

MASTER SCANNER MATRIX CIRCUIT

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit provides the ferrod scan points that are used to monitor service circuits, test circuits, and miscellaneous circuits. It also provides scan points to monitor system status, alarms, and manual controls. The master scanner matrix unit is mounted on control frame 0. It contains 512 ferrods mounted on 32 circuit packs.

2. GENERAL DESCRIPTION OF OPERATION

2.01 The scanner controller contains the control equipment necessary for interrogating the 512 ferrod sensors that form the master scanner matrix and converting their outputs to signals. These signals are returned to the frame input/output controller, thus indicating the state of the ferrods. The scanner controller and frame input/output controller are functional parts of the peripheral control circuit (SD-3H110-01).

FERROD SENSOR

2.02 The ferrod is the basic sensing element of the scanner. It can be considered a 2-winding transformer whose coupling (the ability to induce a signal from the primary winding to the secondary winding) is controlled by the amount of current in the control windings. The primary and secondary windings of the transformer are associated with the interrogate and readout equipment and are referred to as the interrogate winding and the readout winding, respectively.

FERROD SENSOR MATRIX

2.03 The ferrods, one per scan point, are arranged in a 32-by-16 matrix. A row of 16 ferrods is mounted on two ferrod packs (FC183 and/or FC184). Each ferrod pack contains 16 ferrods or two half-rows of eight ferrods each. There is a particular scanner address associated with each row of 16 ferrods. The 16 ferrods in a row are interrogated simultaneously when an address is received by the scanner controller. Addresses to the scanner controller are sent from the processor via the frame input/output controller, and the scanner answer (state of the 16 ferrods) is returned to the processor via the frame input/output controller.

2.04 The control winding terminals, designated high (H) and low (L), from the 512 ferrod sensors are wired to a terminal field. The connecting circuit that is to be monitored is brought into the control frame via this terminal field. Also included in this terminal field are the H and L terminals from 37 ferrods from each network frame.

SECTION II - DETAILED DESCRIPTION

1. DESCRIPTION OF CIRCUIT PACKS

1.01 The master scanner matrix is composed of two types of ferrod circuit packs: the FC183 and the FC184 circuit packs.

1.02 The FC183 ferrod circuit pack has 16 ferrods (type 2C) mounted to form a 2-by-8 matrix. The interrogate windings of the (eight) ferrods, which form a half-row, are connected in series, and the readout windings of each ferrod in one half-row is connected in series with the readout windings of the corresponding ferrod in the other half-row. All control windings of the ferrods on the FC183 ferrod pack are arranged internally in the loop configuration. In this configuration the ferrod control windings are connected in a series-aiding loop on the circuit pack. Battery and ground to energize the ferrods must be supplied externally by the using circuit. Resistors to limit the current in the control windings must be provided by either the master scanner applique circuit (SD-1A210-01) or the using circuit.

1.03 The FC184 ferrod circuit packs have 16 ferrods (type 2C) mounted to form a 2-by-8 matrix. The interrogate windings of the (eight) ferrods, which form a half-row, are connected in series, and the readout winding of each ferrod in one half-row is connected in series with the readout windings of the corresponding ferrod in the other half-row. Ten of the ferrods on the FC184 ferrod circuit pack have their control windings arranged internally in the loop configuration, while the remaining six ferrods have control windings arranged internally in the battery and ground configuration. In this configuration the -48 volt battery and ground are supplied through the ferrod control windings to the using circuit. Resistors to limit the current in the control windings must be provided by either the master scanner applique circuit (SD-1A210-01) or the using circuit.

2. FERROD MATRIX WIRING

INTERROGATE WIRING

2.01 The ferrods are arranged in a 32-by-16 matrix. Two ferrod circuit packs (FC183 and/or FC184), each with two half-rows, comprise two full rows, each having 16 ferrods. Every row has a unique pair of wires used for interrogation. The interrogation pairs are DR00P, DR00N through DR31P, and DR31N.

READOUT WIRING

2.02 The readout wiring represents the columns. The readout loops are SC A00, SC B00 through SC A15, and SC B15. Each readout loop, which terminates on the scanner detector circuit pack (FC135) in the peripheral control circuit (SD-3H110-01), is composed of 32 ferrods. The 32 ferrod circuit packs in the master scanner matrix are combined by unit wiring to form the 32-by-16 ferrod matrix. Each pair of ferrods that each ferrod circuit pack contributes to a column is in parallel with a 15-ohm resistor, which is mounted on a paddleboard that plugs on the rear of the circuit pack connector. This resistor guarantees continuity of the readout loop when a ferrod pack is removed. Each ferrod circuit pack requires two paddleboards having four resistors each.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 2C-Type Ferrod Sensor Control Current:

Minimum Operate Current - 6 mA.
Maximum Nonoperate Current - 3 mA.
Maximum Current - 30 mA.

1.02 This circuit is designed to operate in room ambients between 35° F and 120° F.

2. FUNCTIONAL DESIGNATIONS

2.01 Leads

Designation	Meaning
SDR0000N through SDR0031N SDR0000P through SDR0031P	Interrogate Inputs from Peripheral Control Circuit (0,1)
SCA0 through SCA15 SCB0 through SCB15	Ferrod Read Output For Peripheral Control Circuit (0,1)
H00-00 through H00-15 H31-00 through H31-15	High Side Of Ferrod Control Winding
L00-00 through L00-15 L31-00 through L31-15	Low Side Of Ferrod Control Winding
-48A0 through -48A11 -48B0 through -48B11	-48 Volts Potential (SD-3H902-01) Control Frame Circuit
GNDA0 through GNDA11 GNDB0 through GNDB11	Ground Potential (SD-3H902-01) Control Frame Circuit

3. FUNCTIONS

3.01 Provides ferrod scan points that are used to monitor service circuits.

3.02 Provides scan points to monitor system status, alarms, and manual controls.

4. CONNECTING CIRCUITS

4.01 When this circuit is listed on a keysheet, the connecting information thereon is to be followed.

(a) Control Frame Circuit - SD-3H902-01.

5. MANUFACTURING TESTING REQUIREMENTS

Intermediate Requirements

5.01 None.

End Requirements

5.02 This circuit should be tested to verify that it is wired in accordance with the schematic and wiring diagrams, that the requirements of the circuit requirements table are met, and that the circuit is capable of performing all functions stated in this circuit description.

SECTION IV - REASONS FOR REISSUE

D. Description of Changes

D.1 Provided complete CD information.

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